the threshold value. A phase selector **67** is coupled to the comparator **66**. When the output signal from the programmable matched filter **61** is not less than the threshold value, a corresponding PN code value is applied to the phase selector **67** which also receives an output signal from a clock counter **68**.

In this case, it is possible to rapidly acquire an initial synchronization as compared to the case using the active correlator. It is also possible to extract phase components of PN codes respectively corresponding to multipaths for every sample. The programmable matched filter **61** consists of a well-known matched filter construction with a function of controlling PN codes. Other operations of the searcher are the same as those of the searcher using the active correlator.

As apparent from the above description, the operation of the rake receiving apparatus according to the present invention is updated for every PN code interval so as to effectively reflect a variation in the input signal applied thereto.

FIG. **7** is a graph depicting the result of a computer simulation carried out to verify the performance of the rake receiving apparatus according to the present invention.

The computer simulation was carried out using a processing gain of **64** while giving 5 multipaths and assuming that signals to be combined together have the same intensity.

In FIG. **7**, graphs I to V show the results obtained from the rake receiving apparatus of the present invention while incrementing the number of signals to be combined from one to five. On the other hand, the graph A shows the result obtained from a conventional rake receiving apparatus using three fingers. By referring to FIG. **7**, it can be found that where the number of signals to be combined is three or more, the energy used per bit in the rake receiving apparatus of the present invention is considerably smaller than that in the conventional rake receiving apparatus at the same bit error rate (BER). For example, the conventional rake receiving apparatus requires an Eb/No of about 16 dB for obtaining a BER of 10^{-3}. However, the rake receiving apparatus of the present invention needs about 14 dB for obtaining the same BER when five signals are combined. In this case, therefore, the apparatus of the present invention provides an electric power saving effect of about 2 dB.

As apparent from the above description, the present invention provides a rake receiving apparatus using a single demodulating finger for a plurality of multipath signals. Accordingly, the rake receiving apparatus can achieve a reduction in the complexity of hardware as compared with the conventional rake receiving apparatus. The apparatus of the present invention can provide an effect of easily improving performance even when a large number of multipaths are used.

Although the preferred embodiments of the invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

1. A rake receiving apparatus for a direct sequence code division multiple access communication system comprising:

a radio frequency receiving unit for receiving a radio frequency signal via an antenna and converting the received radio frequency signal into a baseband signal;

analog/digital converting means for converting the analog signal, which is the baseband signal from the radio frequency receiving unit, into a digital signal;

first pseudo noise code generating means for generating and outputting pseudo noise codes;

searching means for receiving the digital signal from the analog/digital converting means and the pseudo noise codes from the first pseudo noise code generating means, thereby outputting pseudo noise code phases respectively corresponding to multipaths;

combiner controlling means for receiving the output signal from the searching means, thereby outputting a signal adapted to have select components combined together from the output signal from the analog/digital converting means;

multipath combiner means for receiving the output signal from the combiner controlling means and the output signal from the analog/digital converting means, selecting multipaths from the output signal from the analog/digital converting means based on the output signal from the combiner controlling means, and combining the selected multipaths;

second pseudo noise code generating means for receiving the output signal from the combiner controlling means, thereby generating pseudo noise codes;

demodulating means for receiving the output signal from the second pseudo noise code generating means and the output signal from the combiner means, thereby demodulating data and outputting the demodulated data; and

synchronization tracking means for receiving the output signal from the second pseudo noise code generating means and the output signal from the combiner means, thereby recovering a synchronization of the pseudo noise codes generated from the first pseudo noise generating means.

2. A rake receiving apparatus in accordance with claim **1**, wherein the multipath combiner means comprises:

sample delay means for receiving the output signal from the analog/digital converter as a received signal and sequentially outputting output signals while selectively delaying the received signal a predetermined time interval;

sample selecting means for receiving the output signals sequentially output from the sample delay means and the output signal from the combiner controlling means and selectively outputting the output signals received from the sample delay means based on the output signal received from the combiner controlling means; and

a combiner for receiving the output signals selectively output from the sample selecting means and combining said output signals.

3. A rake receiving apparatus in accordance with claim **1**, wherein the demodulating means comprises a binary phase shift keying demodulator.

4. A rake receiving apparatus in accordance with claim **1**, further comprising a second analog/digital converting means arranged in parallel to the first analog/digital converting means and second multipath combining means arranged in parallel to the first multipath combining means, and wherein the demodulating means comprises a quadrature phase shift keying demodulator.

5. A rake receiving apparatus in accordance with claim **1**, wherein the searching means comprises:

multiplying means for multiplying the digital signal received from the analog/digital converting means as an input signal of the searching means by the signal generated from the first pseudo noise code generating means to reversely sequence the input signal as a first output signal;

integrating means for integrating first output signals sequentially output from the multiplying means for a predetermined period of time to form a second output signal;